COMSATS University Islamabad, Abbottabad Campus

Department of Computer Science

Examination – Midterm (Fall 2022)

Date: 14 November 2022
Subject: Machine Learning (CSC354)
Instructor: Sara Shafique
Total Time Allowed: 75 mins
Max Marks: 35
Name: _____
Registration # _____

Show all work clearly and legibly. Remember, you are being tested! So even if an answer is obvious to you, please show all the justifications by clearly showing the calculations, or explaining why a calculation is skipped.

Section B

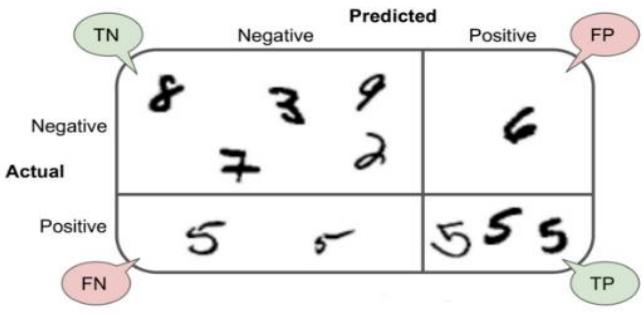
Answer all questions.

1. a) Explain the difference between traditional programming and machine learning. [2 Marks]
   b) Compare Classification with Regression using an example. [2 Marks]

2. Determine type 1, type 2 errors and accuracy for the given confusion matrix. [3 Marks]

		Predicted Values		
Actual Values		Setosa	Versicolor	Virginica	Row Total
	Setosa	5	0	0	5
	Versicolor	0	3	1	4
	Virginica	0	1	5	6
	Column Total	5	4	6	15

3. a) What is the precision and recall tradeoff? [2 Marks]
   b) Calculate precision and sensitivity for a given paradox. [2 Marks]



4. a) Explain correlation types with plots. [2 Marks]
b) Normalize the given data. [2 Marks]

	Student	CGPA	Salary '000
0	1	3.0	60
1	2	3.0	40
2	3	4.0	40
3	4	4.5	50
4	5	4.2	52

Section C

5. a) Distinguish between supervised learning and Reinforcement learning. Illustrate with an example. [5 Marks]

b) Discuss any four examples of machine learning applications. [5 Marks]

6. a) Explain the procedure for computing principal components of the data. [5 Marks]

b) Let's consider a hypothetical case for feature selection where we test the effectiveness of a drug for a certain medical condition. Suppose we have 105 patients under study and 50 of them were treated with the drug. The remaining 55 patients were kept as control samples. The health condition of all patients was checked after a week. The following table shows if their condition improved or not. [5 Marks]

	Responded	Not Responded	Total
Treated	35	15	50
Not Treated	26	29	55
Total	61	44	105